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Q fever in Dalmatia, Croatia

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Q fever has been a well-known and mandatory notifable disease in Croatia from 1954; it occurs usually sporadically in areas predominantly rich with sheep and goats [1].

The mean annual incidence of Q fever in Croatia from 1994 to 2002 was 0.87 reported cases per 100 000 population but in 2003 and 2004 this incidence rose to 3.44 per 100 000. This change in epidemiology was predominantly due to two large outbreaks in north and mid Dalmatia, the central part of the Croatian Adriatic coast.

PATIENTS AND METHODS

Only hospitalised patients with atypical pneumonia caused by *Coxiella burnetii* were included in the study. The 2003 outbreak of Q fever lasted from January to April; 97 patients with pneumonia were hospitalised in three Dalmatian hospitals: 39 in Zadar, 24 in Šibenik and 34 in Split. In 2004 the outbreak, lasting from January to May, involved 100 hospitalised patients: 78 in Zadar, 17 in Šibenik and 5 in Split.

The diagnosis of Q fever was confirmed by seroconversion and/or significant rise (more than double) in the antibody titre by ELISA test; the borderline values for antibodies IgG phase 2 were 20–30 U/mL.

Also, during the outbreak a serosurvey in domestic ungulates, sheep and goats in north Dalmatia was conducted; serum samples were tested by complement fixation test.

RESULTS

Clinical data

The mean age of the hospitalised patients was 35.7 years, and most of them (91%) were men. All patients had a pulmonary form of the disease and 85% had unilateral single opacities on chest X-ray.

Fig. 1. shows annual incidence of hospitalised patients with Q fever before, during and after the outbreaks: a higher incidence in the main outbreak focus, the Zadar county, was measured after the outbreaks in comparison with the other two counties.

Meteorologic data

During the period from January 2002 to December 2004, there were no significant deviations in climatologic characteristics from those usually seen, with weak to moderate speed of the prevaling winds bora and jugo (speeds of 6.7 m/s and 12.3 m/s, respectively). During the period of study there were many more rainy days than after the outbreaks.

Serosurveillance in sheep and goats

Antibodies to *Coxiella burnetii* were detected in 129 (10.8%) of 1196 animals analysed; goats were more often affected than sheep (31.2% vs. 4.7%).

DISCUSSION

Each area in Dalmatia where outbreaks occured is known as an old Q fever focus characterised by traditional sheep and goat breeding, with spo-

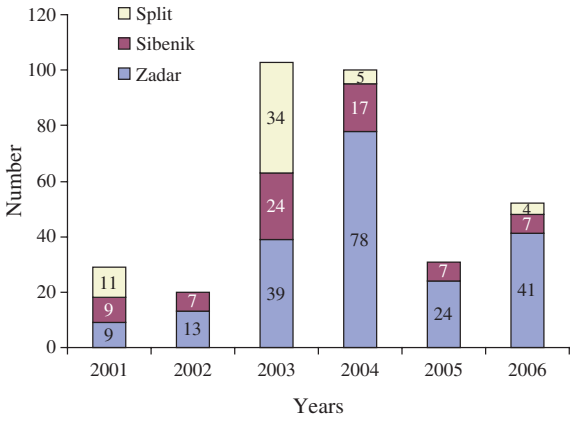

Fig. 1. Hospitalized patients with Q fever in three Dalmatian hospitals from January to April 2001–2006.

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radic cases of human Q fever registered in the past, mostly among residents of rural areas.

In 2003 and 2004, before and throughout the outbreak periods, there were no unusual numbers of animal illnesses or abortions during the lambing and goating seasons. Also, there were no data on importation of new domestic ruminants on the farms. The humans affected were generally middle-aged, mostly male and residents of the epidemic focus area or its vicinity; other affected people lived in various urban places and some of them did not go outside the cities at all. It is our opinion that the outbreaks could be primarly related to the lambing and goating period, which in Dalmatia is mostly (70–80%) from late December to May, and reaches its peak in February. Sporadic cases and rare small familial outbreaks could be related to slaughterhouses, which are very often in the open area and without veterinary control.

Outbreak foci in the Zadar county cover a much larger geographical area with larger animal reservoirs than the other two foci, which could explain the persistence of a higher number of hospitalised cases in this county after the outbreak years.

A number of the affected people, 11 (10.7%) in 2003 and 21 (21.0%) in 2004, lived strictly in urban centres, with no data indicating connections to any infection source. Some reports have suggested an epidemiologic role of wind in Q fever outbreaks, particularly in the case of urban infections [2], but our findings could not rule out other possibilities, e.g. nearby slaughterhouses [3] and other reservoirs (dogs, cats, wild brown rats and pigeons).

To summarise, Q fever in Dalmatia is a result of multifactorial influences depending on interrelationships between animal reservoirs (which are of an increasing spectrum), time when livestock give birth, atmospheric conditions and host immunity. The only firm predictable factors of Q fever in Dalmatia seem to be the season and the precipitation rate. The seropositivity rate in animals varied as was shown earlier [4]; besides, seronegative animals can also shed bacteria [5]. Also, the wind was of only possible influence in the case of outbreaks. The rise of urban cases of Q fever in Dalmatia has raised questions for future research.

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